

DEC 69

COLLINS RADIO COMPANY | Cedar Rapids, Iowa

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FACILITY FORM 602

N 71-70574
(ACCESSION NUMBER)

(THRU)

18
CR-114794
(PAGES)

(CODE)

(NASA CR OR TMX OR AD NUMBER)

(CATEGORY)



CR-1145794

PRELIMINARY SPECIFICATION
FOR
THE LUNAR SOUNDER
SIGNAL SWITCH/CONDITIONER UNIT

4 DECEMBER 1970

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

SECTION I

SCOPE

1.1

This specification covers one type of equipment designated as the Lunar Sounder Signal Switch/Conditioner Unit Collins Type No. TBA to be used in conjunction with the Lunar Sounder HF Transmitter Receiver, Collins Type No. TBA and the Lunar Sounder Antenna Assembly, Collins Type No. TBA. The equipment provides the interface between the HF Transmitter Receivers, the Antenna, and the Data Transmission or storage subsystem.

SECTION III
REQUIREMENTS

3.1 Components

The Lunar Sounder Signal Switch/Conditioner unit shall consist of components mounted on a common chassis.

3.2 General Specification

The requirements of SD69-315 shall apply as requirements of this specification with the exceptions and additions specified herein.

3.3 Selection of Specifications and Standards

Specifications and standards shall be selected in accordance with specification SD69-315.

3.4 Materials

Materials shall conform to the requirements of specification SD69-315.

3.5 Design

The equipment shall incorporate an antenna switch, data conditioner, sync detection and relay, and power distribution circuitry.

The antenna switch shall provide for connecting the antenna to either one of two externally selectable transmitter-receivers.

Video outputs from both receivers shall be provided as inputs to the unit. The unit shall select the video input of the transmitter-receiver currently connected to the antenna, amplify and provide this video as an output on the data output terminals. The unused video input shall be attenuated at the data output terminals.

The unit shall provide a common sync line used to receive commands from both transmitter-receivers, responding to the commands and

relaying these commands to the opposite unit from which the command was received.

The unit shall accept primary power from an external power bus and distribute power to the two HF transmitter-receivers.

3.6 Construction

The Lunar Sounder Signal Switch/Conditioner unit shall be constructed in accordance with SD69-315 except as otherwise noted herein.

3.7 Performance

3.7.1 Power Source

The equipment shall operate from a 28 volt dc source having characteristics specified in SD69-315.

3.7.2 Power Input Requirements

The average power required by the unit excluding power to the two companion transmitters of the system shall not exceed 2.5 watts. The peak power shall not exceed 25 watts.

3.7.3 Power Distribution Requirements

The unit shall accept the primary input power source and distribute the power to internal circuitry and two external transmitter-receivers. Suitable short circuit protection shall be provided between the primary power source and each of the two externally interfaced units to limit or terminate the distribution of power to that unit which demands steady state current in excess of 2 to 3 times the peak current demand level for that unit.

3.7.4 Antenna Switching

A 3 port switch shall be provided which shall be capable of connecting the antenna to either of two transmitter-receiver terminals. Each port shall be provided with a coaxial connector. When all ports are terminated in 50 ohms the VSWR measured at the antenna terminal or at either transmitter-receiver terminal (when that terminal is connected to the antenna) shall not exceed 1.1 to 1.

3.7.4.1 RF Characteristics

The switch shall be capable of routing transmitted RF pulses with peak power levels of 50 watts at 5 MHz and 25 watts at 15 MHz from the transmitter-receiver input terminal to the antenna. RF pulse widths will not exceed 7.5 microseconds with a pulse repetition rate of not greater than 600 pps. Insertion loss shall not exceed 1 db.

The switch shall be capable of routing the antenna input signal to the receiver with a maximum insertion loss of 1 db in the 4.5 to 15.5 MHz range. Signal inputs from the antenna shall be linearly transferred for input levels between -90 dbm to -40 dbm.

Isolation between the two transmitter-receiver terminals and between the antenna terminal and the unconnected receiver shall be not less than 35 db over the frequency range of 4.5 MHz to 15 MHz.

The antenna switch noise figure shall not exceed one db when measured at the T/R No. 1 and T/R No. 2 outputs with all ports terminated in the specified 50 ohm impedance.

3.7.4.2 Antenna Switch Control

The unit shall assign the antenna in response to commands from the transmitter-receivers. Commands from the transmitter-receiver No. 1 shall be interfaced on the SYNC NO. 1 terminals and those of transmitter-receiver No. 2, on the SYNC NO. 2 terminals. A momentary ground (zero, +0.5, -0.0 volts dc) applied to either the SYNC No. 1 or SYNC No. 2 command input terminal shall assign the antenna to the transmitter-

receiver from which the last command was received. The momentary ground will be applied for a duration of not less than 300 ± 30 microseconds and will be capable of sinking not less than 12 milliamperes of current. Antenna transfer shall be completed within 50 microseconds subsequent to the establishment of the momentary ground. A permanent ground condition applied to either command input terminal shall initially switch the antenna in the normal manner; however, subsequent to the initial antenna transfer, the ground shall be effectively absent allowing the antenna switch to respond to the command pulses of the other transmitter-receiver.

3.7.5 SYNC Relay

Commands received on the SYNC NO. 1 line, in addition to initiating antenna transfer, shall be relayed to the SYNC NO. 2 line. Similarly, commands received on the SYNC NO. 2 line shall be relayed to the SYNC NO. 1 line. Relayed commands shall provide a ground capable of sinking not less than 12 milliamperes. Such commands shall be generated within 2 microseconds of receipt of the original command and of a duration equal to the time duration of the received pulse ± 2 microseconds.

3.7.6 Receiver Video Switch/Conditioner

The unit shall provide a 3 port device capable of selecting one of two receiver video inputs and routing the selected amplified video input to the third (data output) port. Coaxial connectors shall be provided for all ports. The receiver video input terminal impedance shall be a nominal 50 ohms.

The selection of the receiver video inputs for application to the output port shall be slaved to the antenna switch, selecting the output of the same receiver currently connected to the antenna.

The selected receiver video input shall be amplified to provide an output at the data output terminal of 2 ± 0.1 volts peak to peak into a 100 ohm load when the input level is 1 volt peak to peak. Frequency response shall be flat ± 0.5 db for all frequencies in the range of 100 KHz to 2 MHz.

The receiver video input not selected shall be attenuated to reduce its effect on the output at the data output terminals. Isolation between the unused receiver video input terminal and the data output terminal shall be not less than 40 db for input levels of 1 volt peak to peak or less and frequencies in the range from 20 Hz to 5 MHz.

3.8 Interchangeability

The interchangeability shall be in accordance with the requirements of specification SD69-315.

3.9 Electromagnetic Interference

The equipment shall meet the electromagnetic interference requirement of specification SD69-315.

3.10 Finish

The equipment shall be finished in accordance with the requirement of specification SD69-315.

3.11 Identification of Product

The equipment shall be marked as specified in specification SD69-315.

SECTION IV
QUALITY ASSURANCE PROVISIONS

4.1 Classification of Tests

The inspection and testing of the Lunar Sounder Signal Switch/Conditioner unit shall be classified as follows:

- (1) Design proof tests
- (2) Acceptance tests

4.2 Design Proof Tests

The equipment shall meet the performance requirements specified herein during the tests specified in Tables 4-1 and 4-2 when subjected to the environment levels and test methods specified in SD69-315 and the Design Proof Test Procedure for the Lunar Sounder Signal Switch/Conditioner Unit.

4.3 Acceptance Tests

Each equipment shall meet the requirement specified herein during the tests specified in Table 4-3. The environment levels and test methods shall be in accordance with specification SD69-315 and the Acceptance Tests Procedure for the Lunar Sounder Signal Switch/Conditioner Unit.

TABLE 4-1 - DESIGN PROOF TESTING REQUIREMENTS

<u>Test</u>	Test Specimen	
	<u>#1</u>	<u>#2</u>
Acceptance Test (Ref.)	X	X
Humidity/Salt Atmosphere	X	
Vibration	X	
Acceleration	X	
Shock	X	
Thermal Vacuum	X	
Explosive Atmosphere	X	
Mission Simulation		X

TABLE 4-2 - DESIGN PROOF TESTS

Test	Acceptance Test (Ref.)	Humidity/Salt Atmosphere	Vibration	Acceleration	Shock	Thermal Vacuum	Explosive Atmosphere	Mission Simulation	Functional
Input Power	X	X	X			X	X	X	X
Power Distribution	X	X				X		X	X
Ant. Switch Insertion Loss	X	X				X		X	X
Ant. Switch Isolation	X	X				X		X	X
Ant. Switch Control	X	X				X		X	X
Ant. Switch Peak Power	X	X				X		X	X
Sync Relay	X	X				X		X	X
Video Sw/Cond. Output Level	X	X				X		X	X
Video Sw/Cond. Freq. Response	X	X				X		X	X
Video Sw/Cond. Control	X	X				X		X	X
Video Sw/Cond. Isolation	X	X				X		X	X
High and Low Voltage	X	X				X		X	X

- 1) The test specimen shall be subject to the Functional Tests before and after each environmental test.
- 2) Tests indicated by an X shall be performed during the tests indicated.

TABLE 4-3
ACCEPTANCE TESTS

- (a) Mechanical Inspection
- (b) Electrical Tests. To be performed at room ambient conditions.
 - (1) Input power
 - (2) Power distribution
 - (3) Antenna Switch Insertion loss
 - (4) Antenna Switch Isolation
 - (5) Antenna Switch Control
 - (6) Antenna Switch Peak Power Capability
 - (7) Sync Relay
 - (8) Video Switch/Conditioner Output Level
 - (9) Video Switch/Conditioner Control
 - (10) Video Switch/Conditioner Isolation
 - (11) Single Point Ground Isolation
- (c) Burn-in Tests To be performed before and after burn-in.
 - (1) All tests b (1) through b (11).
- (d) To be performed at 24 hours during burn-in.
 - (1) Input Power
 - (2) Antenna Switch Insertion Loss
 - (3) Antenna Switch Control
 - (4) Sync Relay
 - (5) Video Switch/Conditioner Output Level
- (e) Vibration Tests
 - (1) Input Power

TABLE 4-3
ACCEPTANCE TESTS

Inspection

Tests. To be performed at room ambient conditions.

Contribution

Return Insertion loss

Isolation

Control

Peak Power Capability

Generator Output Level

Generator Control

Generator Isolation

Isolation

Tested before and after burn-in.

Level (11).

Level during burn-in.

Level

Level before and

Level

Level as indicated.

- (2) Power Distribution
- (3) Antenna Switch Insertion Loss
- (4) Antenna Switch Control
- (5) Sync Relay
- (6) Video Switch/Conditioner Output Level

(f) Thermal Tests

- (1) All tests b(1) through b(11).

SECTION V
PREPARATION FOR DELIVERY

5.1 General Requirements

The equipment shall be preserved and packaged in accordance with specification SD69-315.

SECTION VI

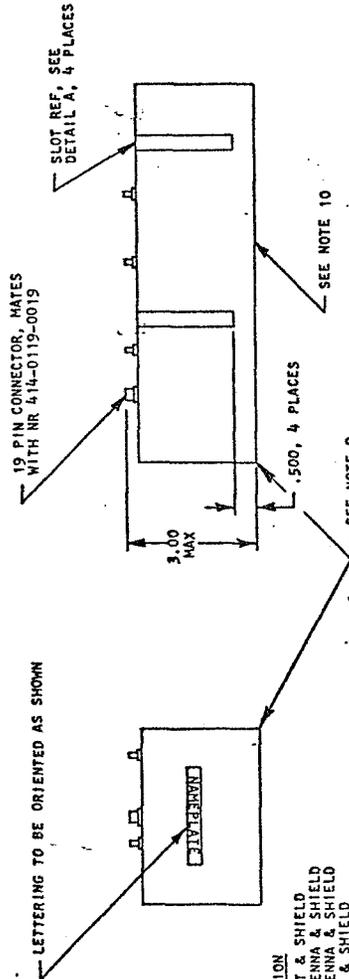
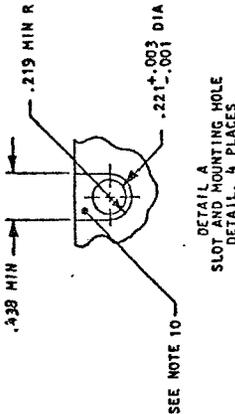
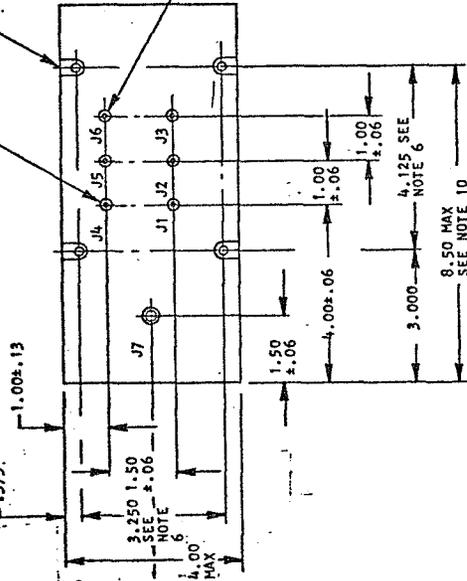
NOTES

UNRELEASED DOCUMENT
NOT TO BE USED FOR PRODUCTION

COAX JACK TO MATE WITH NR ME 414-0250-0309

SEE DETAIL A, 4 PLACES

THICK JACK CONFORMING TO MP 414-0003, MATES WITH NR H3 414-0250-0306, 5 PLACES



- NOTES:
1. DIMENSIONS ARE IN INCHES.
 2. UNLESS OTHERWISE SPECIFIED - TOLERANCES ON:
 - DECIMAL DIMENSIONS - .XX ± .02, .XXX ± .008
 - HOLE DIAMETERS - UNDER .251 DIA ± .005 - .005
 - OVER .251 TO .500 DIA ± .006 - .005
 - OVER .500 DIA ± .008 - .005
 3. ANGLES = ± 1.0°
 4. ECCENTRICITY BETW DIA ON AN AXIS NOT TO EXCEED .010 DIA.
 5. PART SHALL COMPLETE TO 500 ANGLES ± .001 R MIN. EXCEPT EXTERNAL RADIUS OF R .03 ± .001 R MIN. THICKNESS SHALL HAVE 0.03 R MIN.
 6. KNIGHTING HOLES SHALL BE CONTROLLED BY NORTH AMERICAN ROCKWELL DRILL MASTER T7111118, AND SHALL NOT EXCEED A MAXIMUM OF 0.005 INCH TOTAL RADIAL ERROR FROM EACH MATCHED HOLE LOCATION IN THE DRILL MASTER.
 7. WEIGHT: 5 POUNDS MAXIMUM.
 8. CONN REF DESIGNATOR CHARACTERS TO BE 5/32 INCH HIGH.
 9. SHARP CORNERS PERMISSIBLE.
 10. SURFACE SHALL BE CHEMICALLY FILM TREATED AND ELECTRICALLY CONDUCTIVE PER MIL-C-5516A, DATED 31 MARCH 1964.
 11. THIS DRAWING IS INTENDED TO MEET ALL REQUIREMENTS OF NORTH AMERICAN ROCKWELL TCD'S HR 01-12710-134 AND PH 01-12711-134.

CONNECTOR

CONNECTOR	FUNCTION
J1	ANTENNA INPUT & SHIELD
J2	T/R NO. 1 ANTENNA & SHIELD
J3	T/R NO. 2 ANTENNA & SHIELD
J4	VIDEO OUTPUT & SHIELD
J5	VIDEO IN NO. 1 & SHIELD
J6	VIDEO IN NO. 2 & SHIELD
J7-B	PRIMARY RETURN
A	PRIMARY POWER NO. 1
C	PRIMARY POWER NO. 2
P	PRIMARY POWER NO. 1 RETURN
D	PRIMARY POWER NO. 2 RETURN
R	SYNC NO. 1
H	SYNC NO. 1 SHIELD
L	SYNC NO. 2
K	SYNC NO. 2 RETURN
F	SYNC NO. 2 SHIELD
G	SYNC NO. 2 SHIELD
H	OTHER PINS - SPARE

COLLINS RADIO COMPANY
DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
INSTALLATION DRAWING-
LUNAR SOUNDER TIMER ASSEMBLY

PREP M. WITZKE 12/11/70
CHK P. BABOR
APVD P. ZIMMERMAN

C NONE 508-7125-001 AM